HOW CLIMATE CHANGE AFFECTS PEOPLE of the NORTH COUNTRY

I. WETTER SPRINGS & SUMMERS

II. SHORTER, MILDER WINTERS

What do they mean for US?

CITATION: Stager, J.C. (2025). How Climate Change Affects People of the North Country. Adirondack Watershed Institute Climate Reports, No. 3, Paul Smith's College.

WELCOME
to this
HYBRID DOCUMENT

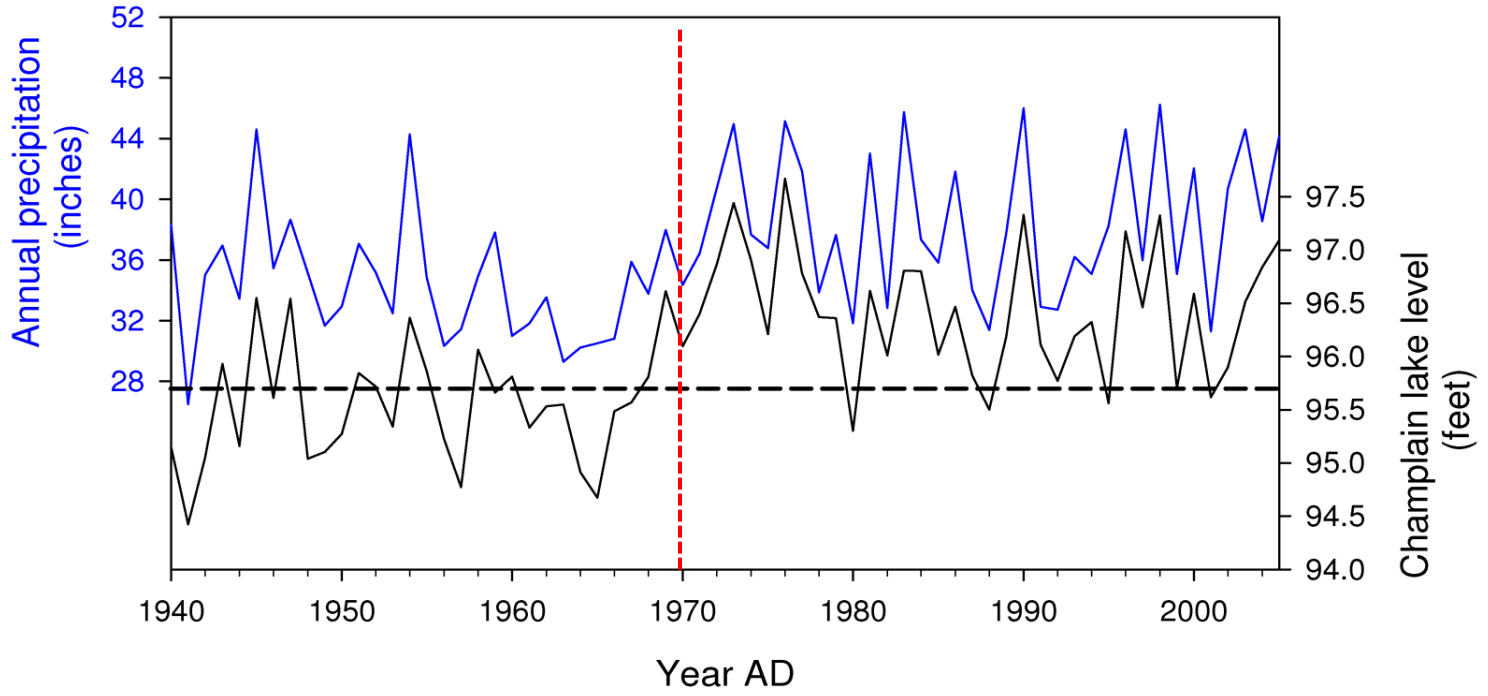
It is both a scientific report and a Powerpoint presentation.

Feel free to use any or all of it for research or educational purposes (*all photos and charts are for public use*).

I. WETTER CLIMATE SINCE THE 1960s

The gage at King Street Dock in Burlington, VT, shows that roughly 3 inches more of **annual precipitation** has been accompanied by a 1-foot rise in the mean **surface level of Lake Champlain**.

Rising water levels can **amplify** the effects of extreme events.



CASE #1. THE WET SPRING OF 2011

LAKE CHAMPLAIN rose in response to heavy rains and snowmelt. It surpassed the standard flood-elevation of 100 feet above sea level for several weeks, reaching a **record high of 103 feet**.

High water levels made marinas and ferry slips **UNUSABLE**

When **Lake Champlain** overtopped its shoreline, the ferry service's main office in South Burlington was **FLOODED.**

Staff kept working as best they could.

Photo courtesy of Russell Fox

Commuting by boat

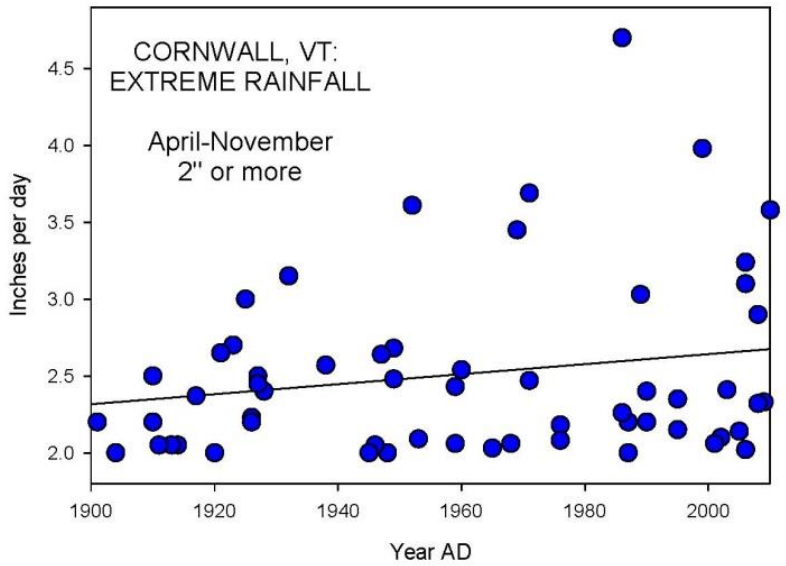
Ferry Service staff struggled to keep vital operations running despite the icy water rising in their garage.

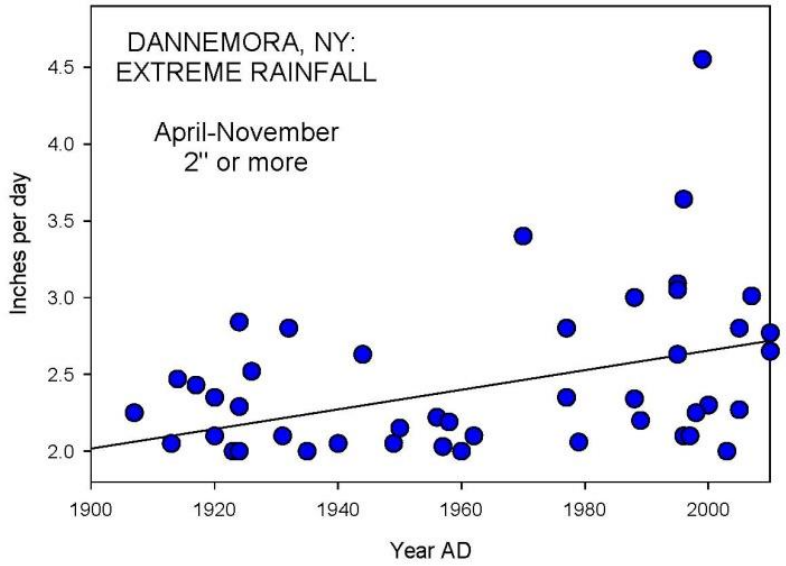
They marked the highest-water line on the wall over **HERE**...
... well above other lines left by **progressively higher** floods before this.

Photo courtesy of Russell Fox

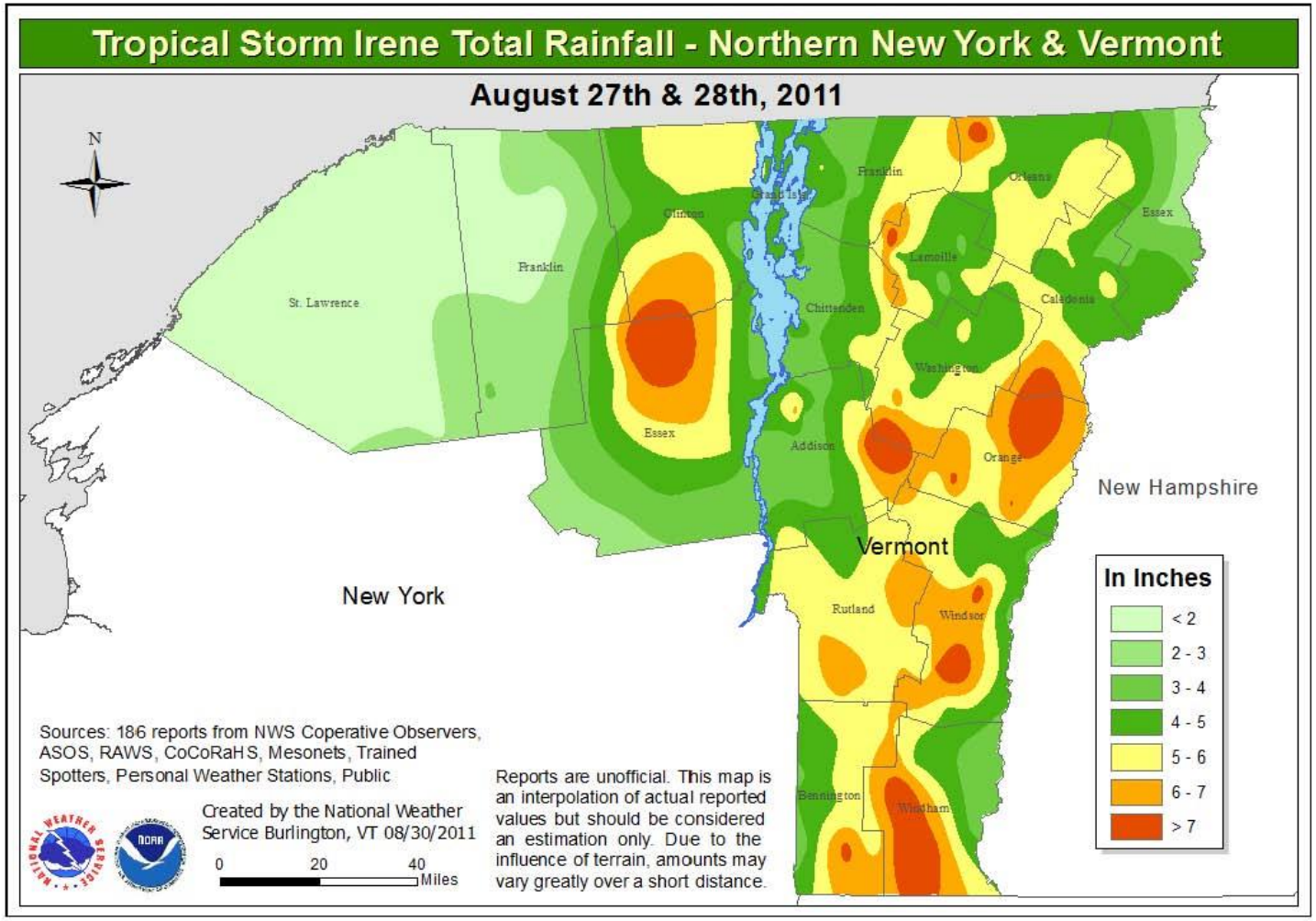
Like most of the world, we have also seen our **extreme rainstorms** become **MORE** extreme, on average.

Ausable River levels, April & August, 2011



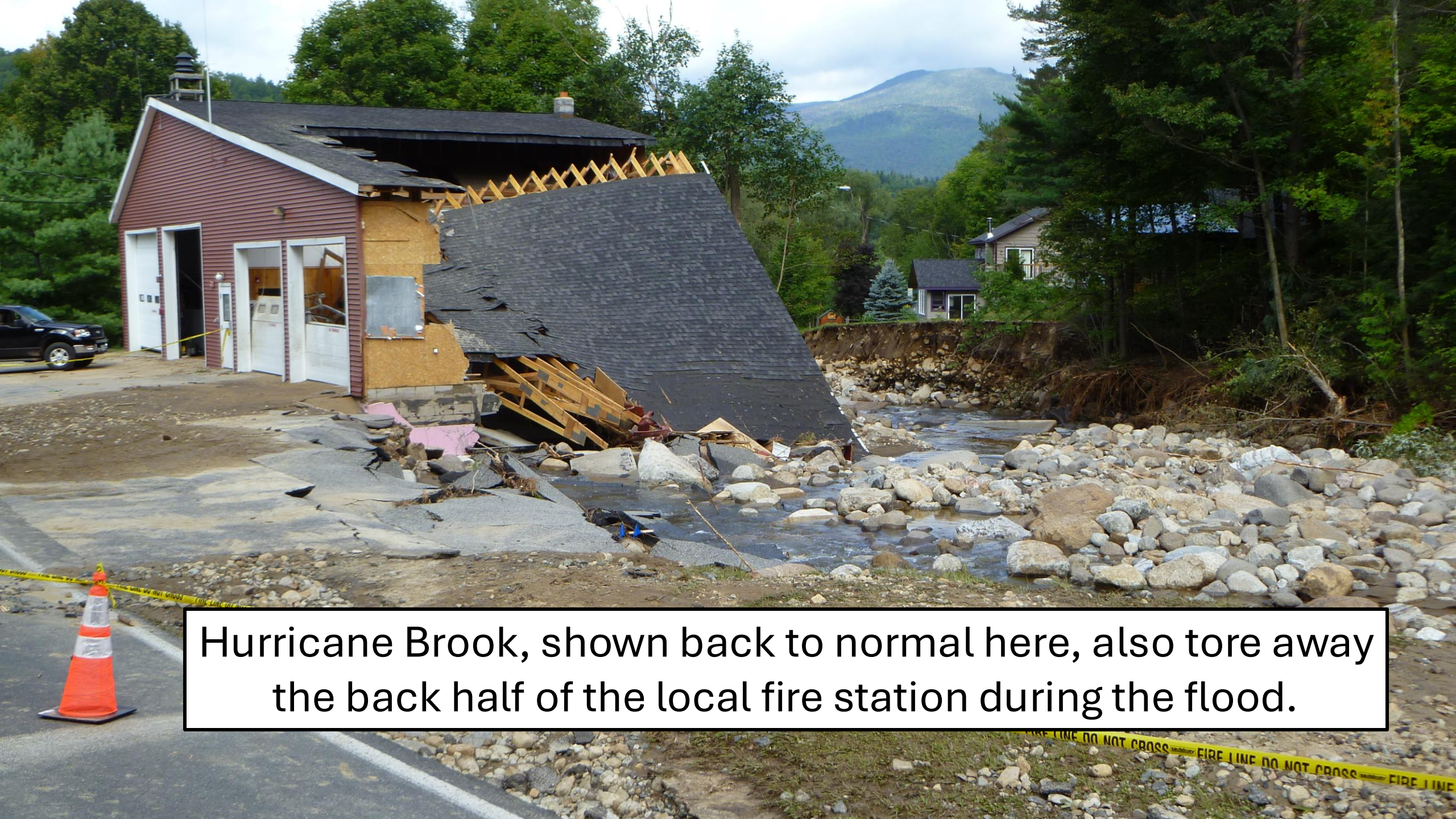


CASE #2: THE IRENE FLOOD OF 2011
Wetter means more vulnerable to EXTREME events



Our mountains act like FUNNELS that shed rain-water down into the valleys where many roads, homes, and settlements are located. Irene did this to the Ausable River watershed.

In Keene, aptly-named **Hurricane Brook** jumped its banks, demolishing homes and sweeping their yards free of soil and vegetation in the center of town.



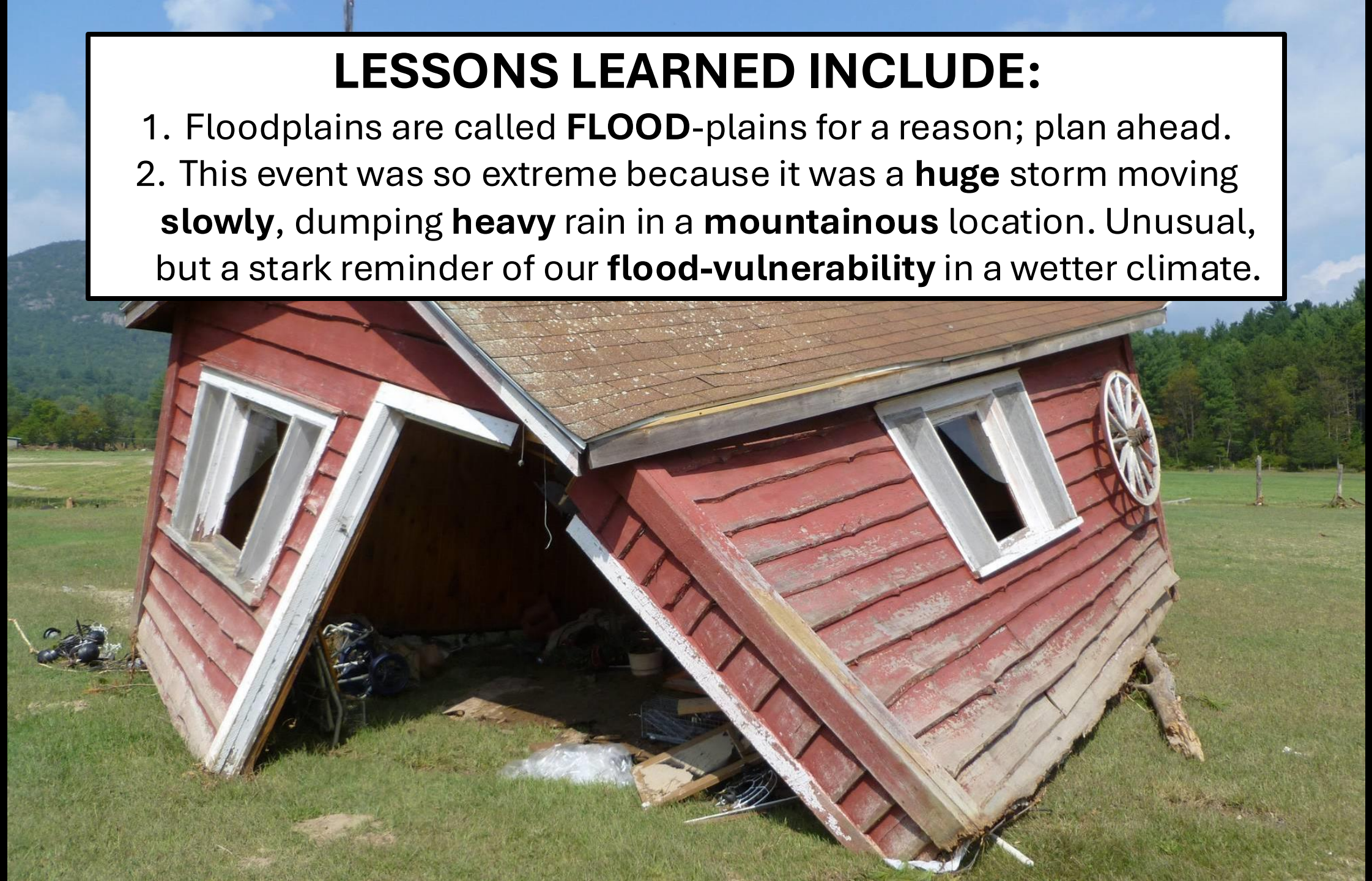
Hurricane Brook, shown back to normal here, also tore away the back half of the local fire station during the flood.

Bridge on the East Branch of the Ausable River near **Ausable Forks**

Floodwaters from the mountains jammed forest debris against the bridge over the West Branch of the Ausable River near **Lake Placid**.

Sudden destruction of rural roads and bridges along the river corridors cut off escape routes and left many residents isolated from resources or assistance.


Fortunately, the flood did not happen at NIGHT when unsuspecting residents were asleep
This house was picked up and dumped on a former field near Jay, along with thick layers of river-borne sand

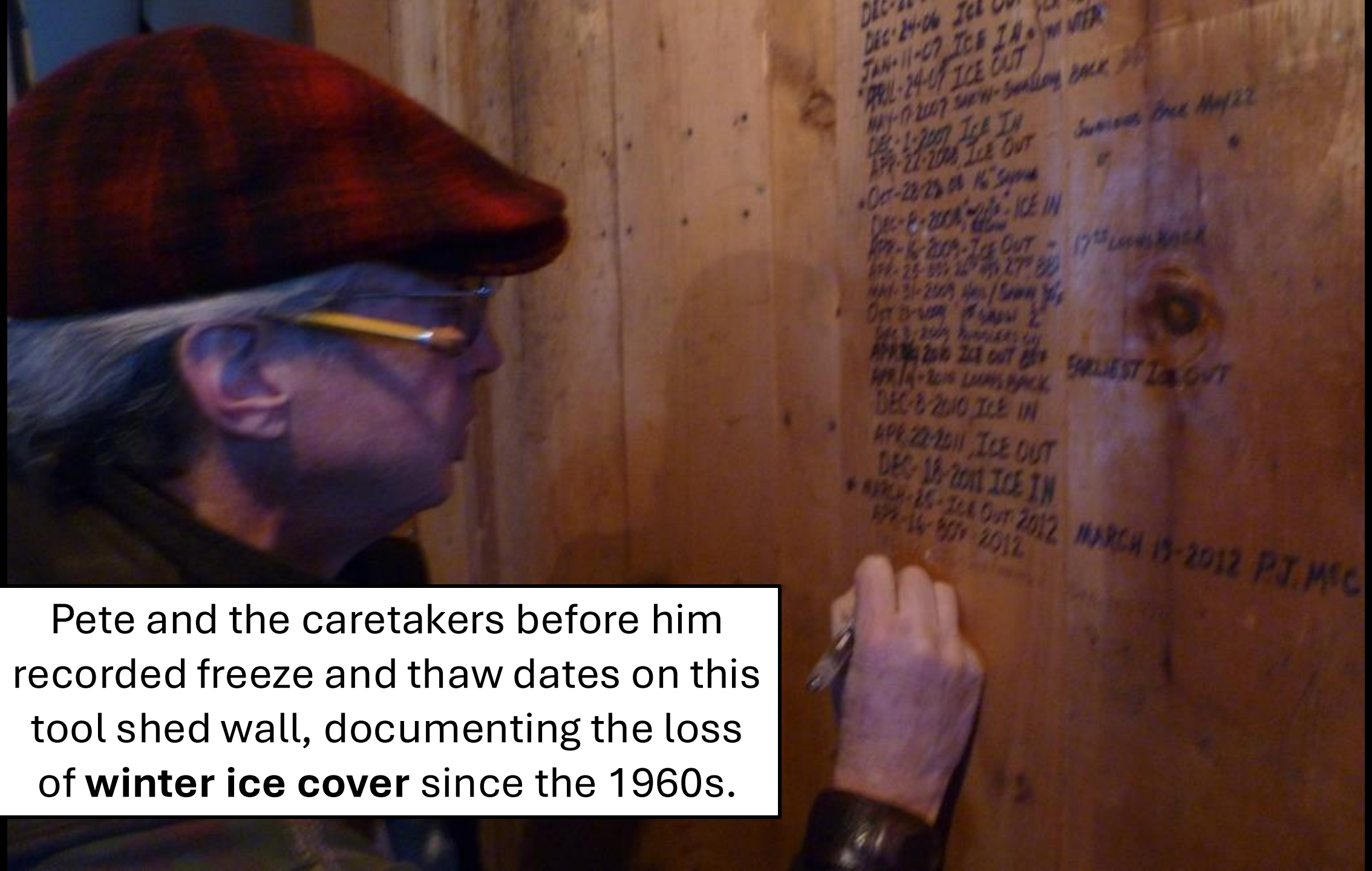


LESSONS LEARNED INCLUDE:

1. Floodplains are called **FLOOD**-plains for a reason; plan ahead.
2. This event was so extreme because it was a **huge** storm moving **slowly**, dumping **heavy** rain in a **mountainous** location. Unusual, but a stark reminder of our **flood-vulnerability** in a wetter climate.

II. OUR WINTERS ARE BECOMING SHORTER & MILDER

Pete McConville, caretaker on Upper St. Regis Lake



Pete and the caretakers before him recorded freeze and thaw dates on this tool shed wall, documenting the loss of **winter ice cover** since the 1960s.

“Where we live defines who we are, and WINTER defines the North Country.”

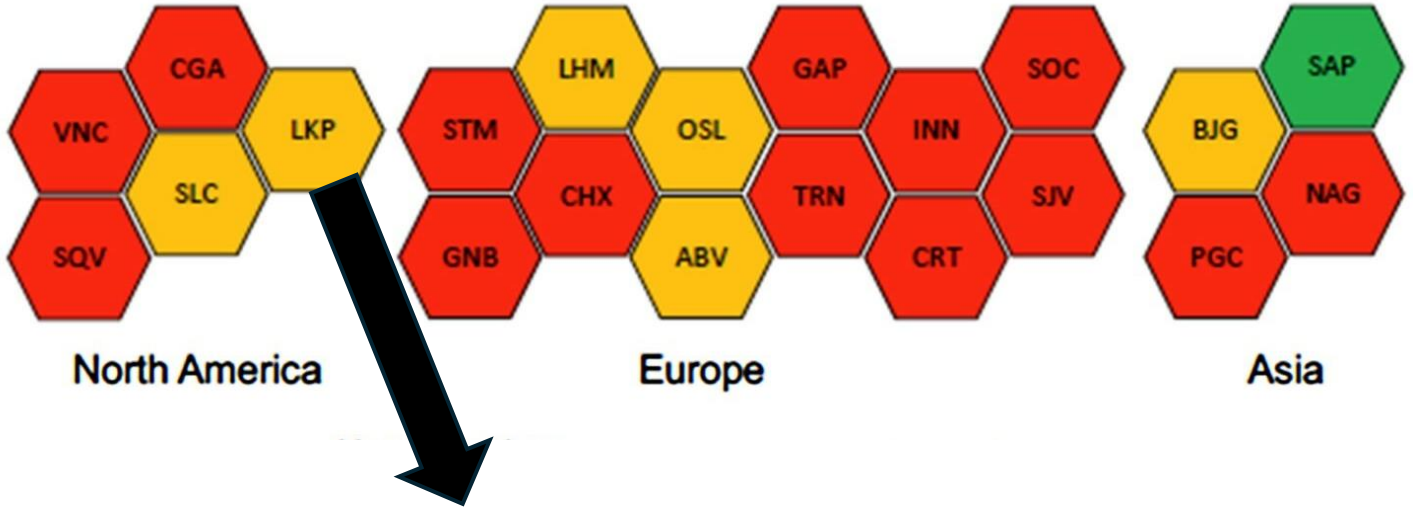
- Chuck Bruha

Outdoor gear provider, Keene Valley

We often identify ourselves as the “**OLYMPIC REGION**,”
…meaning the ***WINTER*** Olympics.

Climate change and the future of the Olympic Winter Games

Scott et al. 2022. Current Issues in Tourism



Host Locations

VNC - Vancouver	GAP - Garmisch-Partenkirchen
SQV - Squaw Valley	TRN - Turin
CGA - Calgary	INN - Innsbruck
SLC - Salt Lake City	CRT - Cortina d'Ampezzo
LKP - Lake Placid	SOC - Sotchi
STM - St. Moritz	SJV - Sarajevo
GNB - Grenoble	BJG - Bejing
LHM - Lillehammer	PGC - PyeongChang
CHX - Chamonix	SAP - Sapporo
OSL - Oslo	NAG - Nagano
ABV - Albertville	

Unreliable

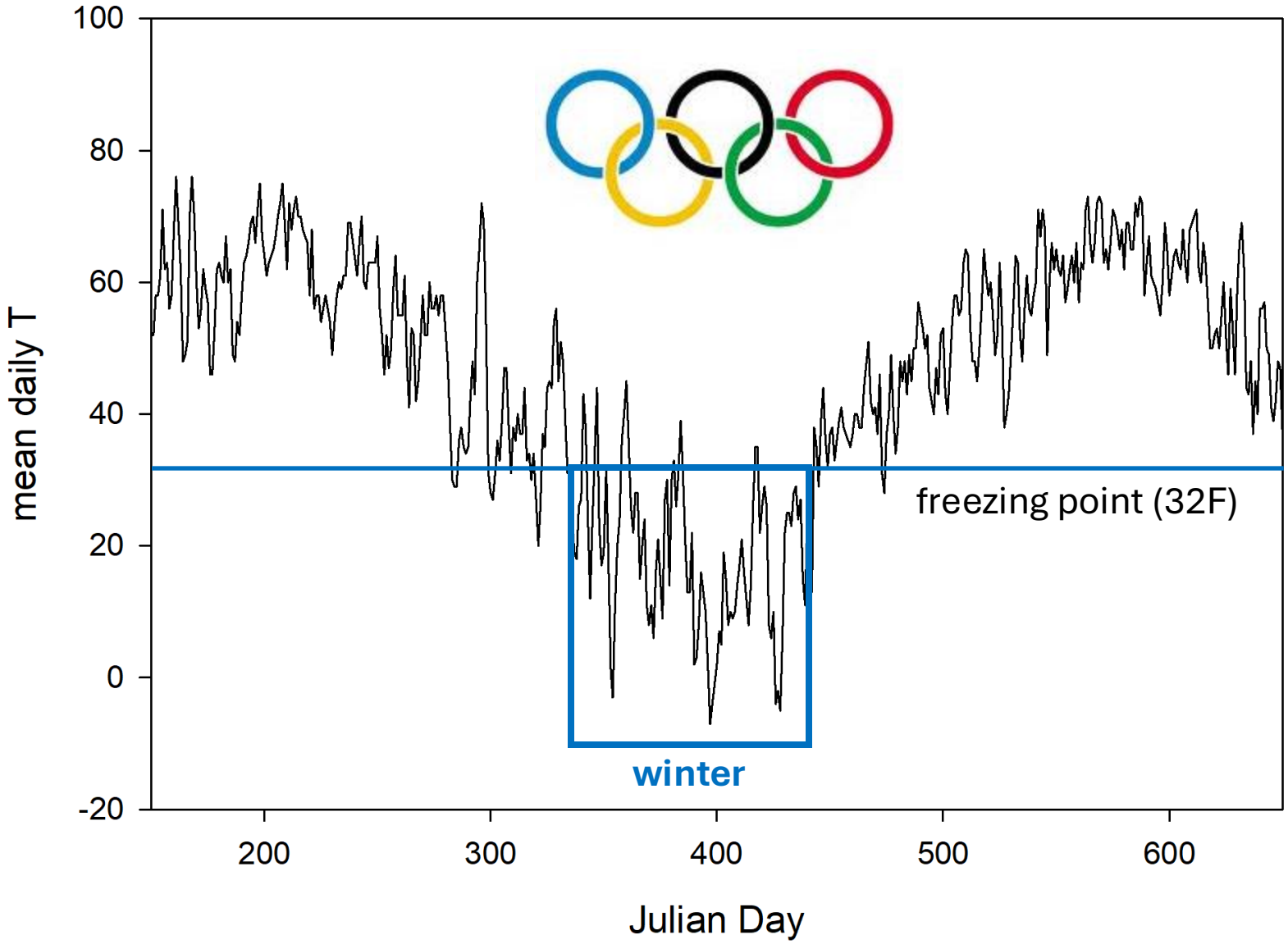
Marginal

Reliable

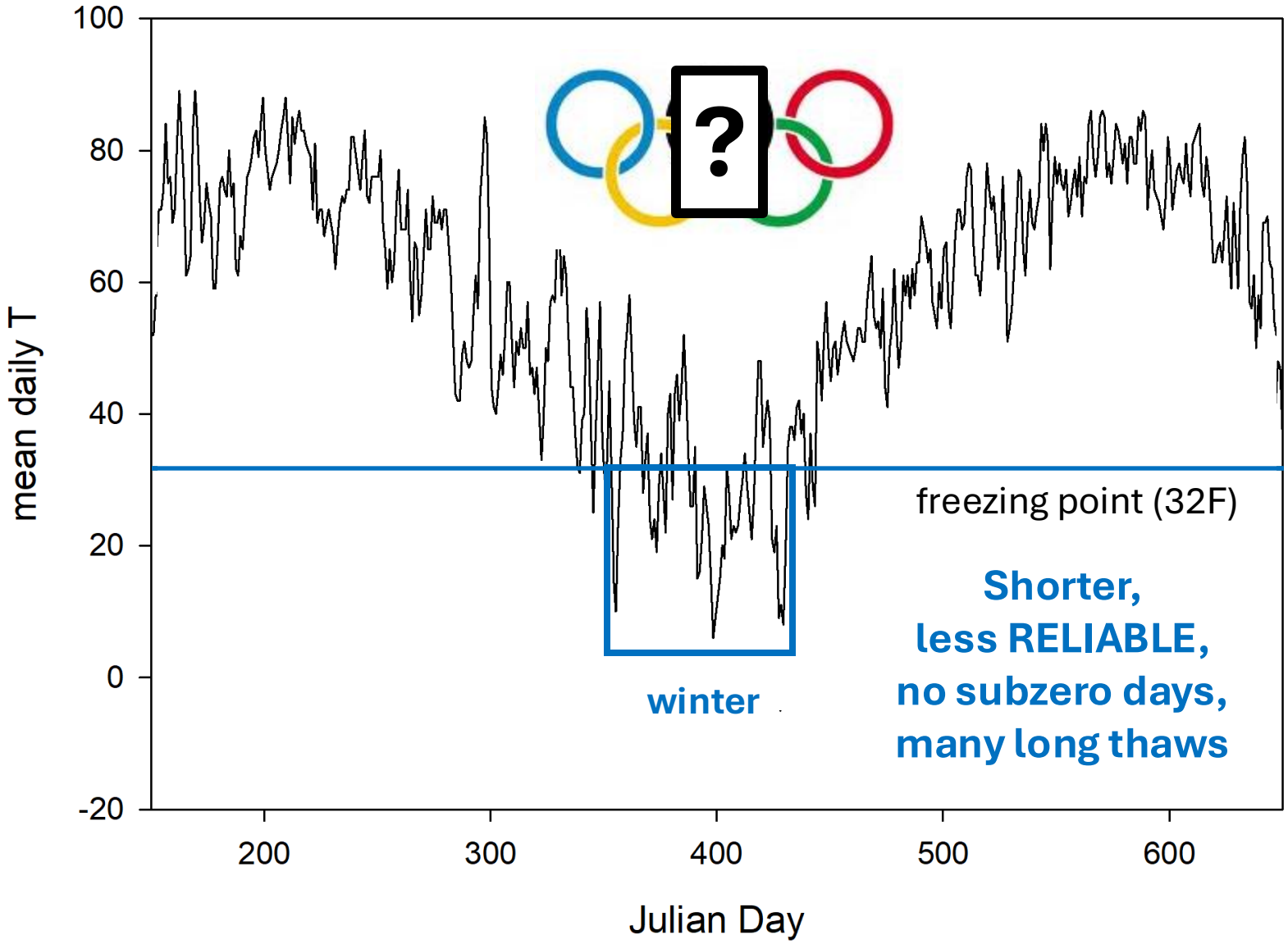
At current warming rates, most former Winter Olympic towns will be unable to host future games by 2100 AD.

LAKE PLACID will be **MARGINAL**.

EXAMPLE: Temperatures in the OLYMPIC WINTER of 1980

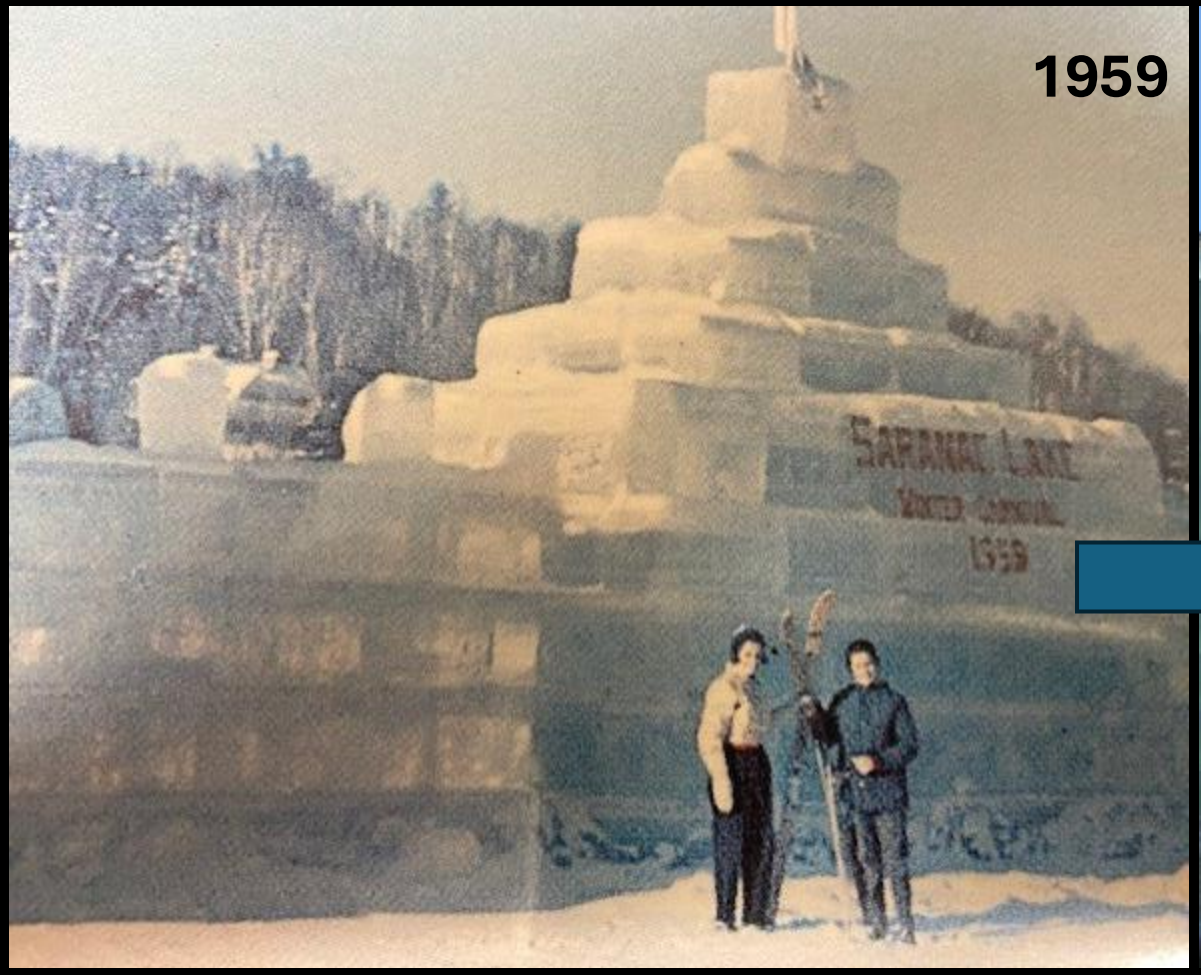


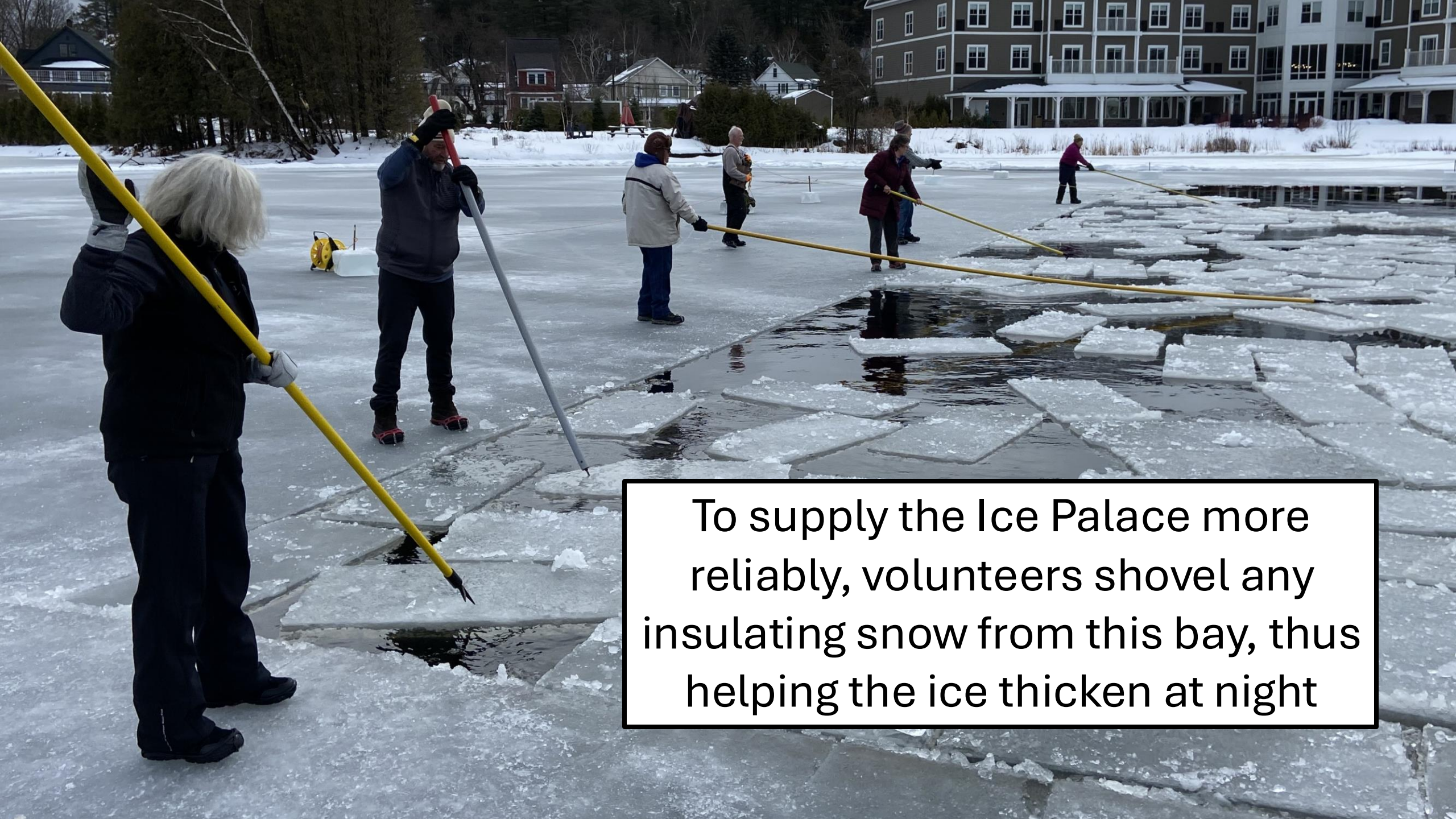
THE SAME WINTER with a warmer baseline in 2100 AD



Saranac Lake's Winter Carnival ICE PALACE

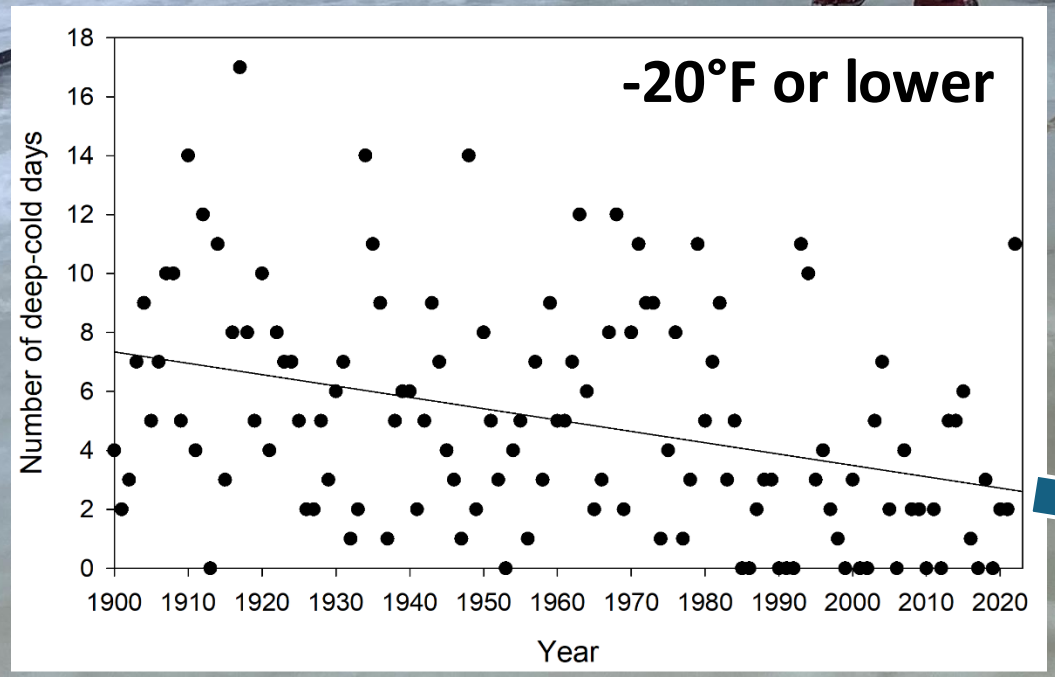
Today's thinner lake-ice blocks are more vulnerable to melting





To supply the Ice Palace more reliably, volunteers shovel any insulating snow from this bay, thus helping the ice thicken at night

Meanwhile, super-cold nights are becoming rarer.



DEEP COLD gone by 2080?


LESS RELIABLE ICE & SNOW
for INFORMAL winter sports, too

Steve Forbes, owner of Parkside Hardware, Wilmington

OTHER ECONOMIC IMPACTS

In addition to running the family business in Wilmington, Steve Forbes helps make ends meet by plowing driveways in winter.

He also keeps paper records of snow conditions and plowing frequency.

Less snow means fewer plowing jobs. That means less income, which in turn means that less money goes to support local businesses.

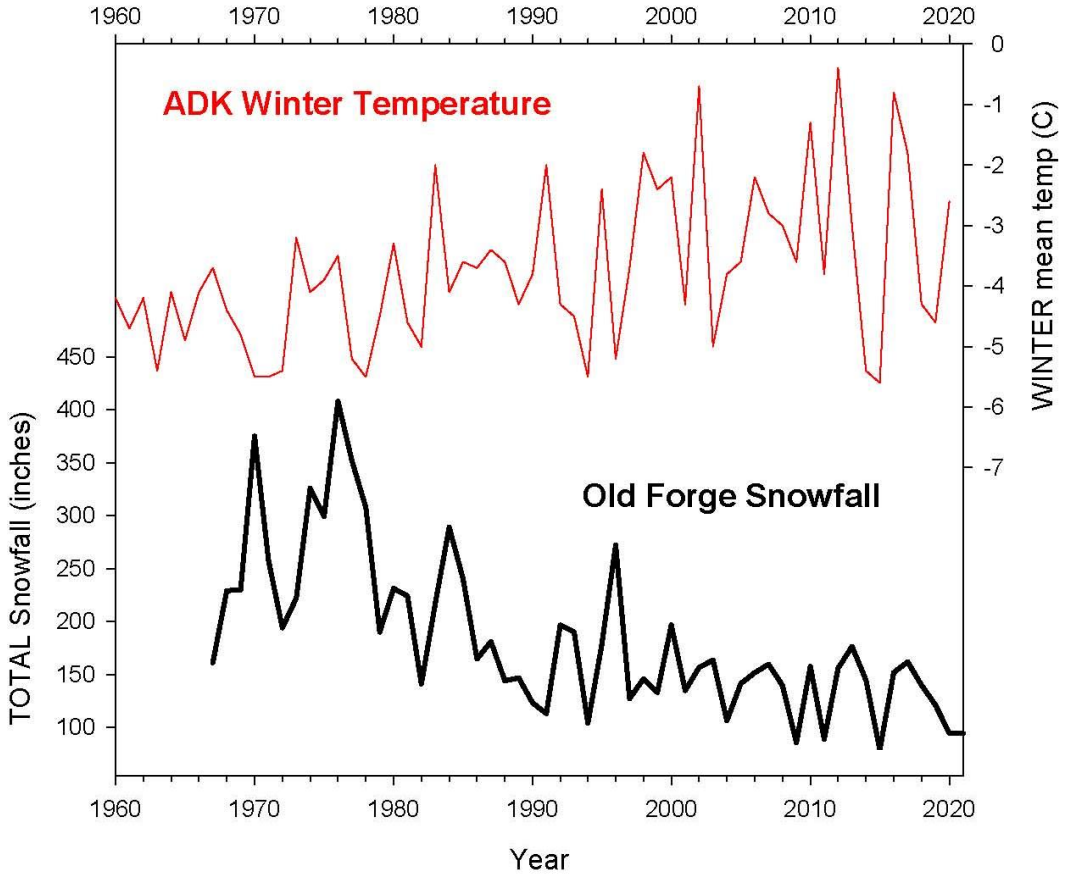
SNOWFALL TOTALS

(IN INCHES)

OLD FORGE, NY

YEAR	SEASON TOTALS	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH
1967-1968	161	42	20	26	54	14
1968-1969	229	43	75	30	39	39
1969-1970	230	20	69	41	43	32
1970-1971	375	11	74	83	59	110
1971-1972	253	40	33	48	64	57
1972-1973	194	32	56	44	29	8
1973-1974	222	21	45	36	32	63
1974-1975	326	32	49	41	85	57
1975-1976	299	18	49	86.5	47	69
1976-1977	408	67	64	95	77	63
1977-1978	3.2	44	79	134	52	43
1978-1979	308	15	97.5	80	50	24
1979-1980	190	17	28	48	39	53
1980-1981	231	41	47	33	50	32
1981-1982	224	22	40	56	43	36
1982-1983	141	18	21	33	8	23
1983-1984	217	34	72	41	15.5	50
1984-1985	289	24	76			
1985-1986	240	17	74			
1986-1987	164.5	13.5	39.5			
1987-1988	181	18	35			
1988-1989	144	17	39.5			
1989-1990	146.5	31	35			
1990-1991	123	12	24.5			
1991-1992	113	6	39			
1992-1993	196.5	9.5	28.5			
1993-1994	190	26	40			
1994-1995	103.75	16	15.9			

A wall-chart in the Old Forge Visitor Center shows decreasing **snowfall** since the 1970s. Shorter, less reliable winters mean less income for this snowmobiling mecca.



Champlain ferry operators prefer crossing a FROZEN lake
despite the need to keep a channel open

1. The ice makes for **SMOOTHER** travel during winter storms
2. Cold winter waves are **DENSER** so they strike with more force

(*SOURCE: Russell Fox, Champlain Ferry Service*)

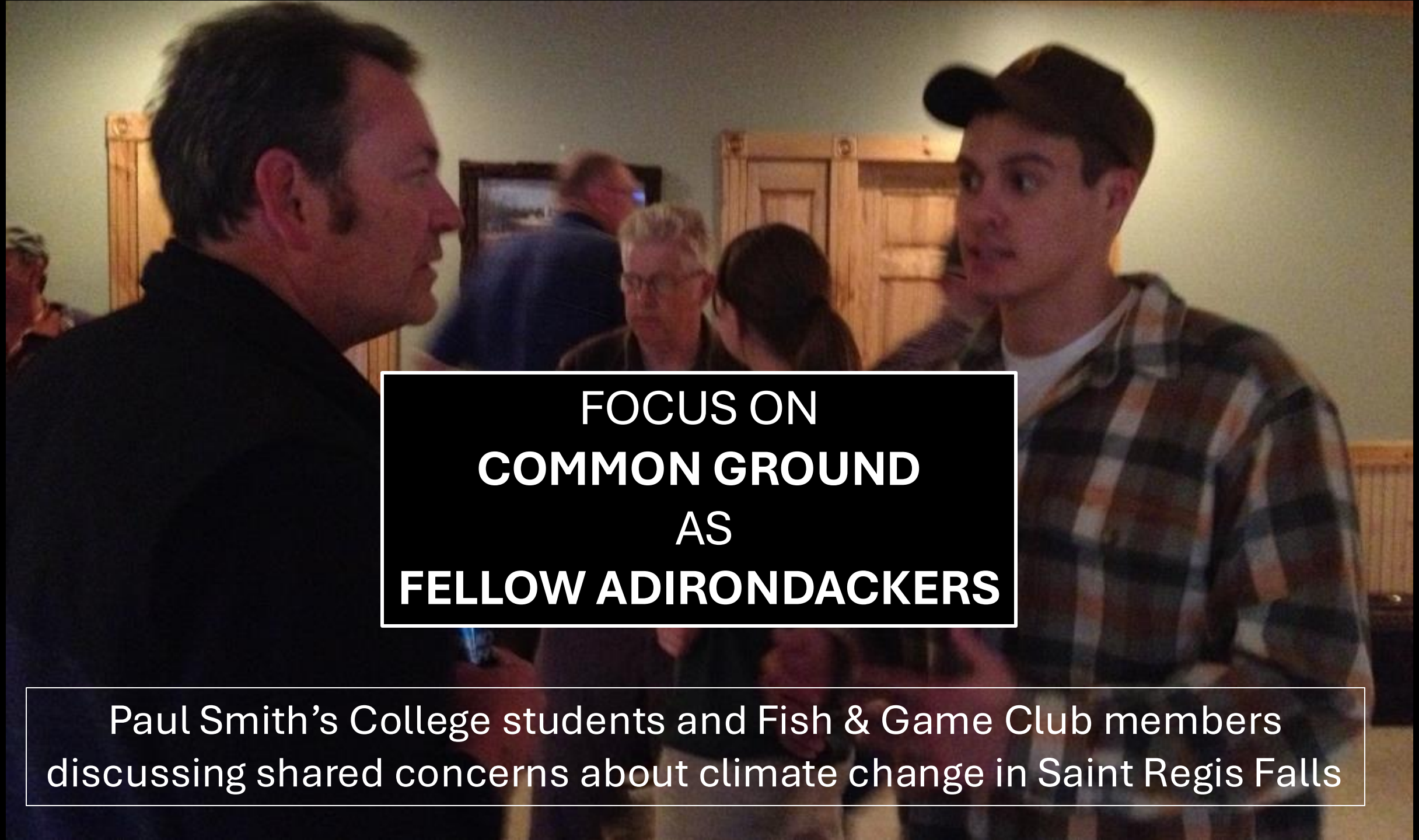
MOVING FORWARD:

RESILIENCE is in our nature as Adirondackers

Saranac Lake’s Winter Carnival parade continues despite RAIN

Community COHESION helps us deal with climate challenges

Keene Valley residents cleaning up after the Irene flood (2011)

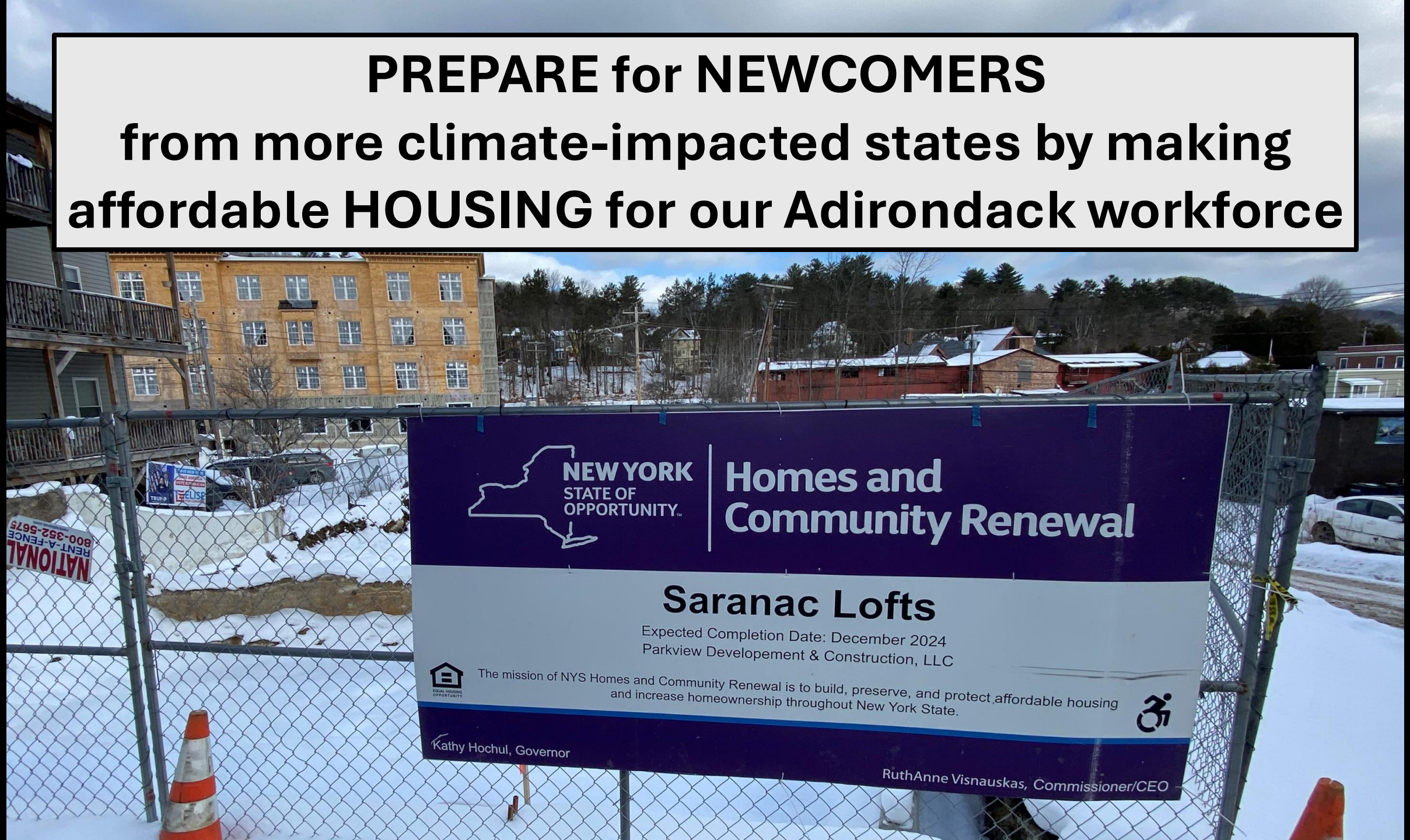


FOCUS ON
COMMON GROUND
AS
FELLOW ADIRONDACKERS

Paul Smith’s College students and Fish & Game Club members discussing shared concerns about climate change in Saint Regis Falls


PREPARE CRITICAL ROADS,
bridges, and culverts for
more flooding

PREPARE for NEWCOMERS
from more climate-impacted states by making affordable HOUSING for our Adirondack workforce



Support ECOLOGICAL RESILIENCE, too

The deep, cold waters of historic Follensby Pond are being managed as a **CLIMATE REFUGE** for threatened lake trout

Adirondack resilience on display at Keene town hall after the Irene flood disaster of 2011

LOCAL COVERAGE OF CLIMATE CHALLENGES (floods, etc.)

CLIMATE MIGRANTS, 2024: https://www.adirondackdailyenterprise.com/news/local-news/2024/08/as-climate-changes-adirondacks-attract-new-residents/

CLIMATE REFUGE, 2024: https://www.adirondackexplorer.org/stories/noaa-climate-education

CLIMATE COMMENTARY, 2020: https://www.adirondackdailyenterprise.com/opinion/guest-commentary/2020/02/dont-think-the-climate-is-changing-go-to-the-adirondacks/

CHAMPLAIN FLOOD OF 2011: https://www.lcbp.org/our-goals/thriving-communities/flooding/floods-of-2011/

IRENE EFFECTS, 2019: https://www.adirondackdailyenterprise.com/news/local-news/2019/05/keenes-irene-rebuild-isnt-over/

IRENE REMEMBERED, 2021: https://www.adirondackexplorer.org/stories/looking-back-at-irene-10-years-later

LONG LAKE FLOOD, 2023: https://www.adirondackexplorer.org/stories/long-lake-dam-owners-face-costly-replacement
and: www.adirondackdailyenterprise.com/news/local-news/2023/07/long-lake-declares-state-of-emergency-due-to-flooding/

REGIONAL FLOODING, 2023: https://www.adirondackdailyenterprise.com/news/local-news/2023/07/local-scientist-says-flooding-getting-more-severe-with-climate-change/

LOCAL COVERAGE OF CLIMATE CHALLENGES (winter, etc.)

CLIMATE SUSCEPTIBILITY STORY MAP FOR THE ADIRONDACKS, 2022:
https://storymaps.arcgis.com/stories/98c36e511cfa4c9b8b40e06930bca415

CLIMATE VOICES, 2025: https://www.adirondackexplorer.org/climate-voices-of-the-adirondacks

CULTURAL & ECONOMIC EFFECTS, 2023: https://www.adirondackexplorer.org/stories/winter-events-switch-gears

EFFECTS ON TOURISM, 2016: https://www.adirondackalmanack.com/2016/02/white-stuff-green-stuff.html

END OF WINTER , 2022: https://www.adirondackalmanack.com/2022/10/the-end-of-winter.html

MORE VISITORS, LESS SNOW, 2023: https://www.adirondackexplorer.org/stories/winter-events-switch-gears

SHORTER WINTERS COMING, 2022: https://www.adirondackexplorer.org/stories/climate-change-study

“WHERE’S WINTER?” 2023: https://www.adirondackalmanack.com/2024/01/wheres-winter.html#:~:text=Human%2Dcaused%20climate%20change%20is,the%20effects%20of%20climate%20change

ADDITIONAL RESOURCES

Adirondack Climate Reports #1-4: https://www.adkwatershed.org/climate-change-research

Background information on Adirondack climate change studies, media, and controversies:
Stager, C. 2011. *Deep Future: The Next 100,000 Years of Life on Earth*. St Martin's Press.

Climate impacts and model projections for the Adirondack-Champlain region: Stager, J.C. and M. Thill. 2010. Climate change in the Champlain basin: What natural resources managers can expect and do. Report for The Nature Conservancy: https://www.researchgate.net/publication/280204504_Climate_Change_in_the_Champlain_Basin_What_natural_resource_managers_can_expect_and_do

Lake Champlain freeze dates: https://www.weather.gov/btv/lakeclose

Lake ice retreat: Beier, C.M., J.C. Stella, M. Dovčiak, S.A. McNulty, 2012. Local climatic drivers of changes in phenology at a boreal-temperate ecotone in eastern North America. *Climatic Change*, DOI: 10.1007/s10584-012-0455-z

New York State Climate Impacts Assessment:
https://nysclimateimpacts.org/explore-the-assessment/new-york-states-changing-climate/

Adirondack phenology & climate monitoring at Paul Smiths: Stager, J.C. *et al.,* 2022. Once and future changes in climate and phenology within the Adirondack uplands (New York, USA). *PLoS Climate:*
https://journals.plos.org/climate/article?id=10.1371/journal.pclm.0000047

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